

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
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Preliminary Draft Staff Report For

Proposed Rule 1143 – Consumer Paint Thinners and Multi-Purpose Solvents

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ACRONYMS USED

AIM	Architectural/Industrial Maintenance Coatings
ASTM	American Standard Test Method
AQMD	South Coast Air Quality Management District
Basin	South Coast Air Basin
CARB	California Air Resources Board
CAS	Clean Air Solvent
CES	Category of Emission Sources
CEQA	California Environmental Quality Act
MEK	Methyl Ethyl Ketone
MSDS	Material Safety Data Sheet
NFPA	National Fire Protection Association
NPCA	National Paint and Coating Association
PCBTF	ParaChloroBenzoTriFluoride
PM _{2.5}	Particulate Matter of 2.5 Microns
PPM	Parts Per Million
PR	Proposed Rule
SEA	Subsequent Environmental Assessment
SIP	State Implementation Plan
TBAc	Tertiary Butyl Acetate
TPD	Tons Per Day
U.S. EPA	United States Environmental Protection Agency
VM & P	Varnish Makers & Printers (Naphtha)
VOC	Volatile Organic Compound

I. EXECUTIVE SUMMARY

Consumer paint thinners and multi-purpose solvents is currently an unregulated category of Consumer Products, typically regulated by the California Air Resources Board (CARB). After an initial proposal to limit the VOC content for consumer paint thinners and multi-purpose solvents to 3% by weight, CARB staff elected to remove this category from their current rulemaking and delay it for future consideration.

The 2007 Air Quality Management Plan (AQMP) highlights the growing impact of VOC emissions from consumer products, the largest single source of VOC emissions in the South Coast Air Basin. Control Measure CTS-04 - Emission Reductions from the Reduction of VOC Content of Consumer Products Not Regulated by the State Board, calls for further emission reductions from consumer paint thinners and multi-purpose solvents not regulated by CARB. Control Measure CTS 04 relies on carryover technology from Rule 1171 and seeks to transfer readily available low- and zero- VOC technology currently in use by stationary sources to the consumer market. If approved, Proposed Rule 1143 – Consumer Paint Thinners and Multi-Purpose Solvents (PR 1143) would fully implement Control Measure CTS 04 from the 2007 AQMP

Key elements of PR1143 include the following:

- Establish a material VOC limit of 25 g/l for consumer paint thinners and multi-purpose solvents, effective January 1, 2010.
- Prohibit the sale and solicitation of non-compliant consumer paint thinners and multi-purpose solvents
- Require distributors and manufacturers of consumer paint thinners and multi-purpose solvents to obtain a distributor or manufacturer's ID#, respectively, by July 1, 2009.
- Require point-of-sale containers to display VOC content as supplied and for recommended dilution, date of manufacture, and registration confirmation.
- Establish exemptions for products sold in the District for shipment outside the District, thinning and clean-up of specialty coatings, as well as products used in analytical, educational, and laboratory uses.

As proposed, the rule would reduce emissions by 9.85 tpd or 96.6% for the consumer paint thinner and multi-purpose solvent universe. The estimated socioeconomic impacts of the proposed amendment will be presented in the Draft Staff Report.

II. BACKGROUND

Consumer Products are the largest source of VOC emissions in the South Coast Air Basin (Basin). CARB estimates that consumer products in the state of California account for approximately 245 tons per day (tpd) of VOC emissions¹. Approximately forty-five percent (45%) of that estimate or 110.3 tpd of VOC emissions² can be attributed to the basin.

The 2007 AQMP highlights the growing impact of VOC emissions from consumer products. Taking into account population growth and planned VOC reductions by CARB, the AQMP estimates that the annual average VOC emissions for the consumer product category will be 107 tpd by the year 2014, and will likely increase to 112.1 tpd by the year 2020³.

California Health and Safety Code section 41712 authorizes CARB to regulate certain consumer products. “Consumer product” is defined as a chemically formulated product used by household and institutional consumers. *See* Cal. Health & Safety Code § 41712(a)(1). Although CARB regulates numerous categories of consumer products, consumer paint thinners and multi-purpose solvents are currently an unregulated category. The AQMD therefore has the authority to regulate this category of consumer products. *See* Cal. Health & Safety Code § 41712(f); *see infra* Section IV. Indeed, Control Measure CTS-04 – Emission Reductions from the Reduction of VOC Content of Consumer Products Not Regulated by the State Board specifically calls for further emission reductions from consumer paint thinners and multi-purpose solvents not regulated by CARB. As such, if approved, PR 1143 would implement Control Measure CTS-04 from the 2007 AQMP.

Consumer paint thinners and multi-purpose solvents work very well for cleaning such deposits as grease, oil, paint, carbon deposits, including other residues from tools, equipment, and general household uses. As mandated by CTS-04, PR 1143 targets products offered for sale and use within the district. Similar to Rule 1113 – Architectural Coatings, PR 1143 would apply to suppliers, distributors and retailers of consumer paint thinners and multi-purpose solvents. PR 1143 would limit the VOC content of products sold to consumers, since solvent cleaning operations conducted as part of a business are already regulated under Rule 1171.

Control Measure CTS-04 – as implemented through PR 1143 – relies on carryover technology from Rule 1171 by transferring readily available low – and zero – VOC technology currently in use by stationary sources to the consumer market. Rule 1171 restricts most cleaning solvents to 25 g/L or less VOC at permitted facilities, as well as some non-permitted facilities. As part of the Rule 1171 implementation, the AQMD developed the Clean Air Solvent (CAS) program to highlight ultra-low VOC technology, as well as provide a marketing tool for the manufacturers of these ultra-low VOC products. In order to qualify for the CAS certification the following criteria must be met:

1. VOC concentration is no more than 25 grams of VOC per liter of material, as applied;

¹ *See* <http://www.arb.ca.gov/consprod/geninfo/cpsmog.htm>

² This estimate does not reflect additional VOC reductions proposed by CARB.

³ *See* Final 2007 Air Quality Management Plan, Chapter 3

2. Composite vapor pressure is no more than 5 mm Hg of VOC at 20°C (68° F);
3. Reactivity is not higher than toluene; and
4. Contains no compounds classified as Hazardous Air Pollutants (HAPs) by the federal Clean Air Act, Ozone-Depleting Compounds (ODCs), or Global Warming Compounds (GWCs).

Many of the solvent technologies certified under the CAS program have utility as consumer paint thinners and multi-purpose solvents. The most common and effective cleaners that meet this criteria are water-based or aqueous cleaners that contain little or no VOCs, although other options such as VOC exempt compounds are also available to the user. Of the 171 certified CAS, staff has found 102 products that could be used in the consumer market. Staff continues to assess the CAS list and will update the list with any new findings that are directly applicable to the products covered by this proposed rule.

CURRENT TECHNOLOGY

Several manufacturers of traditional paint thinners and multi-purpose solvents are shown in Table 1. Based on a review of the solvent industry, the largest manufacturer of these products is Brenntag Pacific, a German company that has manufacturing and distribution plants around the world, including the South Coast AQMD. The raw solvents generally come from the petroleum refineries.

TABLE 1: PARTIAL LIST OF SOLVENT MANUFACTURERS

MANUFACTURER	CITY	STATE
Brenntag Pacific	Santa Fe Springs	California, U.S. of A.
W.M. Barr and Company, Inc.	Memphis	Tennessee, U.S. of A.
Citco Petroleum Corp	Rolling Meadows	Illinois, U.S. of A.
SunnySide Corp	Wheeling	Illinois, U.S. of A.
Sterling-Clark-Lurton Corp	Malden	Massachusetts, U.S. of A.
Recochem Inc.	Montreal	Quebec, Canada
Shell Chemicals	Houston	Texas, U.S. of A.
Sunoco, Inc	Philadelphia	Pennsylvania, U.S. of A.
Mid-America Chem Corp.	Cleveland	Ohio, U.S. of A.
Union Carbide	Danbury	Connecticut, U.S. of A.

Multi-purpose solvents are available at a variety of retail outlets, including mass merchants like Lowe's and Home Depot, as well as smaller hardware stores. It is estimated that 1,212,931.5⁴ gallons of these high-VOC containing solvents are sold in the AQMD jurisdiction each year. Only one of these popular solvents is exempt as a VOC and that product is commonly known

⁴ Based on 10.2 tpd and using 736 g/L VOC as the sales weighted average

as acetone. Multi-purpose solvents are formulated for various uses from paint thinning to equipment and general clean-up. The most common multi-purpose solvents currently sold are shown in Table 2, and they are sold in quart, gallon and 5-gallon size capacities. A brief explanation of each solvent is included in Appendix A.

TABLE 2: VARIOUS SOLVENTS COMMONLY FOUND AT HARDWARE STORES

SOLVENT	VOC CONTENT	BOILING POINT	FLASH POINT ¹ (TCC)	HEALTH RATING ²	FLAMMABILITY RATING ³	EVAPORATION RATE (Butyl Acetate = 1)
Acetone	Exempt	133.2 °F	4.6 °F	1	3	5.7
Denatured Alcohol	797 g/L	150.8 °F	53.5 °F	1	3	2.3
Isopropyl Alcohol	786 g/L	180.0 °F	53.0 °F	1	3	2.3
Lacquer Thinner	797 g/L	212.6 °F	7.4 °F	2	3	2.7
MEK	807 g/L	175.0 °F	21.8 °F	1	3	4.4
Mineral Spirits	781 g/L	349.9 °F	104.7 °F	1	2	0.1
Paint Thinner	838 g/L	299.6 °F	93.6 °F	2	3	1.4
Toluene	870 g/L	230.8 °F	41.8 °F	2	3	2.0
Turpentine	863 g/L	323.7 °F	94.3 °F	1	3	0.7
VM&P Naphtha	754 g/L	266.9 °F	53.1 °F	1	3	1.2
Xylene	870 g/L	293.2 °F	79.3 °F	2	3	1.4

1 - TCC is the standard Tagliabue Closed Cup

2 - Based on NFPA Rating System

Values in table are from an average of multiple MSDS sheets

There are different methods that can be used to determine the flashpoint of a solvent but the most frequently used method is the Tagliabue Closed Cup standard (ASTM D56), also known as the TCC. The flashpoint is determined by a TCC laboratory device which is used to determine the flash point of mobile petroleum liquids that have a flash point temperature below 175 °F (79.4 °C).

The Health and Flammability ratings are designated by the NFPA and employ a rating system that ranges from 0 to 4 and is shown in Table 3.

**TABLE 3:NFPA HEALTH AND
FLAMMABILITY RATINGS**

RATING	HAZARD
0	Least
1	Slight
2	Moderate
3	High
4	Extreme

III. TECHNOLOGY REVIEW

There are currently three different categories of products that lend themselves to low and zero-VOC formulations. 1.) Aqueous technology is typically used for thinning waterborne coating products, 2.) Exempt solvents include acetone, PCBTF, and methyl acetate, as well as blends of the three, 3.) Bio based technology including methyl esters is currently available for a variety of uses, including lowering the volatility of exempt solvents. The majority of the architectural coating products are now waterborne coatings and the large majority of these do not require any thinning.

There are several manufacturers, as highlighted in the certified CAS list that have formulated and are marketing products that comply with the proposed limit of 25 g/L by using VOC-exempt compounds. Aqueous formulations and bio-based technology that can replace the higher-VOC products are currently on the market. The following details each of the three technologies.

AQUEOUS SOLVENTS

There are many aqueous based cleaning solvents and several have been certified for the AQMD's CAS Program. These solvents are regulated under Rule 1171, Solvent Cleaning Operations. Currently, many manufacturers have adapted to waterborne products to meet the VOC limits. Many of these products, especially coatings, do not require thinning, and are typically supplied as ready to be used. There are some waterborne coatings that are thinned, typically with water, under certain climatic conditions, especially when spray-applied.

CURRENTLY EXEMPT SOLVENTS

ACETONE

Acetone is a colorless, highly volatile liquid that has a fragrant, mint-like odor. Common uses for acetone are nail polish removers and for clean-up. It has a high solvent strength greater than the other types of solvents, except for xylene, which has a similar solvent strength. Acetone is widely available at retail stores that sell solvents.

As a VOC - Acetone is currently listed as an exempt solvent pursuant to Rule 102, Group I. Acetone was originally “delisted” as a VOC by USEPA in 1995.

Flammability – Acetone has a NFPA rating of 3 for flammability indicating that it is a highly flammable solvent.

Toxicology - Acetone has a NFPA rating of 1 which indicates that it has a slight health risk. It is also produced in the human body, albeit in small amounts. Acetone can be harmful if inhaled, ingested or absorbed through the skin and can be fatal in large quantities.

PARACHLOROBENZOTRIFLUORIDE (PCBTF)

Parachlorobenzotrifluoride is a colorless liquid with a distinct aromatic odor and is commonly referred to as PCBTF. It's commonly used in the printing industry to dissolve ink, but is also used as a cleaning solvent in other industries. Oxsol 200 and Oxsol 300 are used automotive industry for parts washing as a compliant and suitable replacement for Stoddard solvent.

As a VOC - PCBTF is currently listed as an exempt solvent pursuant to Rule 102, Group I.

Flammability – PCBTF has a NFPA rating of 3 for flammability indicating that it is a highly flammable solvent.

Toxicology – PCBTF has a NFPA rating of 1 for health which indicates that it has a slight health risk. The vapors from PCBTF can irritate the nose, throat, skin, and eyes.

METHYL ACETATE

Methyl Acetate is also known as acetic acid methyl ester or methyl ethanoate and is a colorless liquid with a fragrant, fruity odor. Methyl Acetate is commonly used as a solvent in adhesive and nail polish removers.

As a VOC - Methyl Acetate is currently listed as an exempt solvent pursuant to Rule 102, Group I.

Flammability – Methyl Acetate has a NFPA rating of 3 for flammability indicating that it is a highly flammable solvent.

Toxicology – Methyl Acetate has a NFPA rating of 2 for health which indicates that it has a moderate health risk. The vapors from methyl acetate can irritate the nose, throat, skin, and eyes.

BIO-BASED COMPLIANT SOLVENTS

Several manufacturers have already formulated cleaning solvents using methyl esters such as soy, coconut and grape seed based formulations. There are several of these currently available products that have been certified by the District as CAS. Methyl esters can be used in solvent based coatings because they are miscible in solvent but not in waterborne products. Methyl esters also mix well with acetone and have been used to formulate blends that can meet a 25 g/L VOC requirement, and also have the additional benefit of lowering the overall volatility.

Staff has found low-VOC paint thinners that already meet the proposed 25 g/L VOC limit for both waterborne and solvent-based coatings sold at several suppliers and these are summarized in the table below.

TABLE 4: LOW-VOC PRODUCTS CURRENTLY AVAILABLE

MANUFACTURER NAME	PRODUCT NAME	VOC _{MATERIAL} (g/L)	CURRENTLY AVAILABLE?
Bortz Distributing	Low-VOC Lacquer Thinner	< 25	Yes
Sunnyside Corporation	Green Envy Paint Thinner	19	Yes
Packaging Services Co., Inc.	Crown Paint Thinner NEXT	0	Yes
RAMCO Specialty Products, Inc.	Soylent Gold Soybased Degreaser	25	Yes
Deft Finishes	VOC Exempt Reducer IS-256	0	Yes
Deft Finishes	VOC Exempt Reducer IS-276	0	Yes
Rust-Oleum Corporation	VOC Compliant Thinner	0	Yes
Carboline Company	Thinner 243 E	0	Yes

IV. LEGISLATIVE AUTHORITY

The California Legislature created the South Coast Air Quality Management District (AQMD) in 1977 (The Lewis-Presley Air Quality Management Act, California Health and Safety Code Section 40400 *et seq.*) as the agency responsible for developing and enforcing air pollution control rules and regulations in the Basin. By statute, the AQMD is required to adopt an AQMP demonstrating compliance with all state and federal ambient air quality standards for the Basin. *See* Cal. Health & Safety Code § 40460(a). Furthermore, the AQMD must adopt rules and regulations that carry out the AQMP. *See* Cal. Health & Safety Code § 40440(a).

As discussed above, Control Measure CTS-04 of the 2007 AQMP specifically calls for emission reductions from consumer paint thinners and multi-purpose solvents not regulated by CARB. Although California Health and Safety Code section 41712 authorizes CARB to regulate certain consumer products, local air districts retain the authority to adopt VOC standards for any consumer product category for which CARB has not already adopted a standard. *See* Cal. Health & Safety Code § 41712(f). Because CARB has not adopted any rules or regulations that currently address consumer paint thinners and multi-purpose solvents, the AQMD has the authority to regulate this category of consumer products.

V. RULE PROPOSAL

PR 1143 will limit the VOC content of consumer paint thinners and multi-purpose solvents to 25 g/L beginning January 1, 2010. The proposed rule will reduce emissions of VOCs from the use, storage and disposal of these solvent materials that are commonly used in thinning of coatings and the clean up of coating application equipment and any other solvent cleaning operation. The proposed rule will apply to any person who supplies, sells, offers for sale, or manufactures any consumer paint thinners and multi-purpose solvents for use in the District

PR 1143 will also require recordkeeping and require the submittal of an AQMD quality and emissions report to allow the District to maintain an accurate VOC emissions inventory and track the progress of the VOC reductions. The rule will require all consumer paint thinners and multi-purpose solvents to be registered prior to sale, which is expected to enhance compliance and allow the District to monitor the products as well as sales and emissions of all consumer paint thinners and multi-purpose solvent products. This proposed rule will:

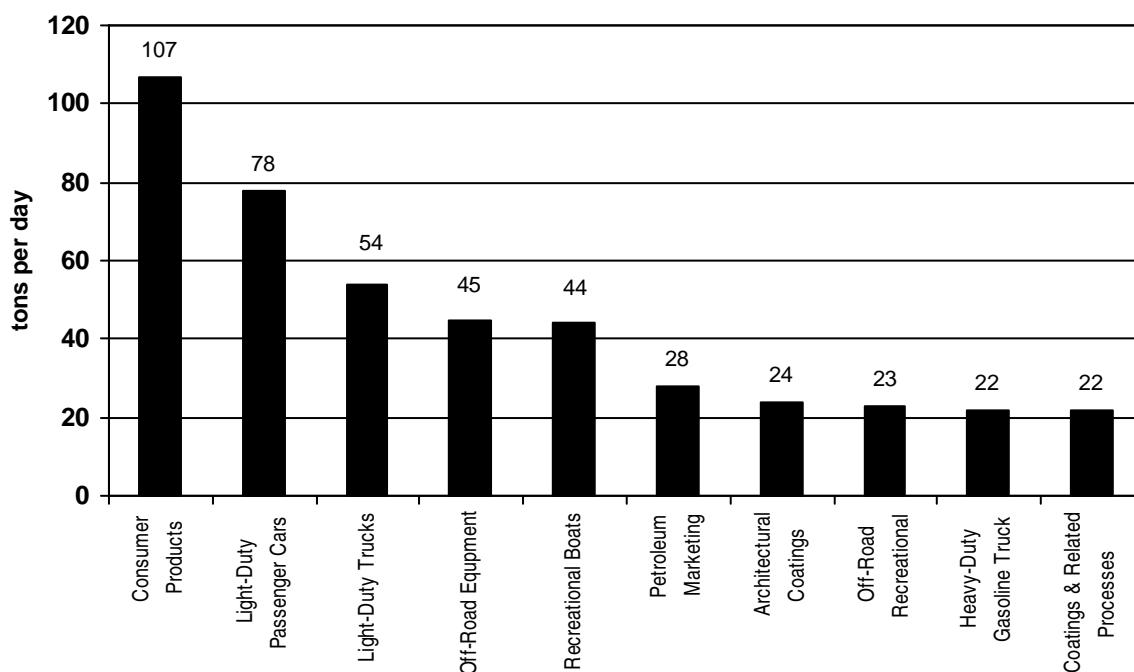
1. Establish the VOC limit for consumer paint thinners and multi-purpose solvents to 25 g/L, effective January 1, 2010.
2. Proposed definitions:
 - **Consumer** means any person who seeks, purchases, or acquires any consumer product for personal, family, household, or institutional use. Persons acquiring a consumer product for resale are not “consumers” for that product.
 - **Distributor** means any person to whom a consumer product is sold or supplied for the purposes of resale or distribution in commerce, except that manufacturers, retailers, and consumers are not distributors.
 - **Paint Thinner** are solvents that are manufactured for the purpose of reducing the viscosity of coating compositions or components and displays the term “Paint Thinner”, “Lacquer Thinner”, “Thinner”, or “Reducer” on the front panel of its packaging.
 - **Multi-purpose Solvents** include:
 - A. products that do not display specific use instructions on the product container or packaging,
 - B. products that do not specify an end-use function or application on the product container or packaging, and
 - C. Solvents used in institutional facilities, except for laboratory reagents used in analytical, educational, research, scientific or other laboratories.
 - **Retail Outlet** means any establishment at which consumer products are sold, supplied, or offered for sale directly to consumers.

- **VOC:**
 - is any volatile compound of carbon, excluding methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate, and exempt compounds.
 - Grams of VOC per liter of material.
3. Create a mechanism for distributors and manufacturers distributing products in the SCAQMD to obtain an ID.
4. Require Recordkeeping:
- Maintain a copy of the filing application receipt.
 - Maintain records of annual consumer paint thinner and multi-purpose solvent sales and determine VOC emissions. Records shall include,
 - Production records
 - Distribution records
 - Sales records
5. Identify exemptions:
- Products manufactured for areas outside of the AQMD.
 - Certain solvents necessary for thinning and clean-up of polyaspartic and polyurea Industrial Maintenance Coatings.
 - Educational and research use.

The VOC reduction is estimated to be 9.85 tpd by the year 2014.

VI. EMISSIONS INVENTORY

This proposed rule would seek to reduce VOCs from consumer paint thinners and multi-purpose solvents sold as consumer products by establishing a VOC content limit for each category. Graph 1 shows the estimated VOC emissions for consumer products in 2014 and compares these emissions to other large categories of VOC emissions in the basin. The consumer products category is the largest category and shows that by the year 2014, the VOC emissions from consumer products are expected to be 107 tpd.



GRAPH 1: CONSUMER PRODUCTS VERSUS MANY OTHER CATEGORIES FOR VOC EMISSIONS – YEAR 2014.

CARB has and continues to lower VOC emissions from consumer products. The most recent CARB proposal aims to reduce 2.5 tpd of VOC from 25 different categories for consumer products in the South Coast AQMD jurisdiction by 2015. However, current rulemaking has been delayed to further assess the feasibility and any adverse environmental impacts.

The AQMP inventory for consumer paint thinners and multi-purpose solvents, based on CARB's Category of Emission Sources (CES) #88047 for multi-purpose solvents, is expected to increase from 6.3 tpd for year 2002 to 7.3 tpd by year 2014, and up to 7.6 tpd by year 2023, if uncontrolled. In addition to CES #88047, staff determined the applicability of two other CES inventories. The 2014 baseline emissions for the three CES are shown in Table 5 and sum-up to 10.2 tpd of VOC emissions.

VII. EMISSION REDUCTION – CURRENT INVENTORY

The proposed rule will establish a VOC content of 25 g/L for consumer paint thinners and multi-purpose solvents, and with the majority of current sales comprised of high VOC solvents, the sales weighted average VOC content is approximately 736 g/L.

The 2007 AQMP shows that the baseline emissions for selected consumer products including lacquer thinners and paint thinners by the year 2014 will be 7.3 tpd. However, AQMD's current baseline inventory, which includes the applicable VOC sources, is summarized below.

TABLE 5: BREAKDOWN OF AVAILABLE CES SOURCES

INVENTORY DESCRIPTION	CES #	VOC EMISSIONS (tpd)
Multi-purpose Solvents	88047	7.450
Clean-up Solvents	92106	0.969
Thinning Solvents	92114	1.783
	TOTAL	10.202

The volume for each CES can also be determined by using the sales weighted average 736 g/L,

$$736 \text{ g/L} * (1 \text{ lb/Gal} / 119.83 \text{ g/L}) = 6.14 \text{ lb/Gal VOC, and,}$$

$$\text{Multi-purpose Solvents, CES \#88047} = 7.45 \text{ tpd} = 14,900 \text{ ppd of VOC emissions,}$$

$$(14,900 \text{ pounds} / 6.14 \text{ ppg}) * 1 \text{ day} = 2,426.7 \text{ gallons/day} = 885,745.5 \text{ gallons/yr}$$

$$\text{Cleanup Solvents, CES \#92106} = 0.969 \text{ tpd} = 1,938 \text{ ppd of VOC emissions,}$$

$$(1,938 \text{ pounds} / 6.14 \text{ ppg}) * 1 \text{ day} = 315.6 \text{ gallons/day} = 115,194 \text{ gallons/yr}$$

$$\text{Thinning Solvents, CES \#92114} = 1.783 \text{ tpd} = 3,566 \text{ ppd of VOC emissions,}$$

$$(3,566 \text{ pounds} / 6.14 \text{ ppg}) * 1 \text{ day} = 580.8 \text{ gallons/day} = 211,992 \text{ gallons/yr}$$

The total solvent usage for these three categories is estimated to be 3,323.1 gallons per day or 1,212,931.5 gallons per year.

Using the sales weighted average of approximately 736 g/L VOC, the rule proposes a 96.6% reduction in VOC emissions. This is calculated by,

$$\{(SWA \text{ VOC} - \text{Proposed VOC}) / SWA \text{ VOC}\} = \{(736 - 25) / 736\} = 0.966 \text{ or } 96.6\%,$$

The anticipated total emission reduction can then be calculated by,

$$10.2 \text{ tpd} * 96.6\% = 9.85 \text{ tpd by 2014}$$

Implementation of this proposed rule is expected to achieve emission reductions of up to 9.85 tpd by the year 2014. Any emission reductions resulting from the implementation of this control measure will be credited towards AQMD's SIP obligation.

It should be pointed out that during the rule development process, arguments have been made that the actual emission inventory may be significantly lower than the one estimated above, which was based on the latest CARB survey, already several years old. Potential overlap among different categories, implementation of Rules 1113 and 1171, which is catalyzing the migration toward water based products that do not require thinning or clean-up with VOC-based solvents, has been given as plausible reasons for a lower inventory. While the arguments presented may have an impact on the inventory, until a new survey is conducted, staff is obligated to use the inventory estimate based on the latest CARB data used in the 2007 AQMP.

Staff is committed to adjust the inventory once more updated survey information becomes available. However, it should also be pointed out, regardless of the size of the inventory, the estimated relative percent reduction expected should remain the same when migrating from conventional solvents to alternative compliant products.

VIII. COST ANALYSIS

Proposed Rule 1143 implements Control Measure CTS-04 from the 2007 Air Quality Management Plan. This rule, if adopted, will affect retail outlets that currently offer for sale high-VOC containing consumer paint thinners and multi-purpose solvents. The consumer will also be affected by the difference in cost of the substitute products used to replace the high-VOC containing solvents. Essentially, the low-VOC substitute consumer paint thinners and cleaners will displace the high-VOC containing consumer paint thinners and multi-purpose solvents in all the retail outlets in the AQMD jurisdiction.

The AQMD estimates that 1,212,931.5 gallons of high-VOC paint thinners and multi-purpose solvents are sold by retail outlets in the AQMD jurisdiction per year. AQMD staff surveyed prices for the high-VOC paint thinners and multi-purpose solvents, and then averaged the prices for quart size and gallon size containers, the standard size containers sold by the retail outlet stores. AQMD staff also calculated the sales weighted average for the high-VOC containing products and determined a value of 736 g/L of VOC. The average cost for the high-VOC containing products were determined to be,

\$7.18 / Quart and \$18.01 / Gallon

The emissions for one year, based on the 1,212,931.5 gallons estimate, are calculated as,

$$736 \text{ g/L} * (1 \text{ lb/gal}/119.83 \text{ g/L}) * 1,212,931.5 \text{ gal/yr} = 7,449,867.2 \text{ lbs/yr or } 3,724.9 \text{ tons/yr}$$

To determine emissions per day, the factor 365 days/yr is used because the retail outlets offer the high-VOC products for sale 7 days a week,

$$(3,724.9 \text{ tons/yr})/(365 \text{ days/yr}) = 10.2 \text{ tons/day}$$

The new technologies are based on three different chemistries, exempt solvents, exempt solvent based aqueous, and soy based products.

ACETONE AND ACETONE-BASED TECHNOLOGY

Acetone is an exempt compound pursuant to District Rule 102 and is considered a zero VOC product. AQMD staff surveyed several acetone products and averaged the prices for quart container and one-gallon container sizes,

\$8.44/quart and \$21.05/gallon

The cost-effectiveness can therefore be calculated for the acetone quart size containers by using,

$$(\$Cost_{Acetone} - \$Cost_{High-VOC})/Qt / (VOC_{High-VOC} - VOC_{Acetone}),$$

$$(\$8.44 - \$7.18)/Qt / (736 \text{ g/L} - 25 \text{ g/L}) =$$

$$(\$8.44 - \$7.18)/Qt / (6.14 \text{ lb/Gal} - 0.21 \text{ lb/Gal}) = \$0.8499/\text{lb or } \$1,699.83/\text{ton of VOC}$$

{Note: $736 \text{ g/L}(\text{lb/gal}) / 119.83 \text{ g/l} = 6.14 \text{ lb/gal}$ and $25 \text{ g/L}(\text{lb/gal}) / 119.83 \text{ g/l} = 0.21 \text{ lb/gal}$ }

The cost-effectiveness can therefore be calculated for the acetone one-gallon size containers by using,

$$(\$Cost_{Acetone} - \$Cost_{High-VOC})/Gal / (VOC_{High-VOC} - VOC_{Acetone}),$$

$$(\$21.05 - \$18.01)/Gal / (6.14 \text{ lb/Gal} - 0.21 \text{ lb/Gal}) = \$0.5127/\text{lb or } \$1,025.30/\text{ton of VOC}$$

AQUEOUS BASED CLEANERS

There are aqueous products that meet the 25 g/L and less VOC limits that are currently available. Staff averaged the prices for quart container and one-gallon container sizes and found,

\$7.25/quart and \$33.39/gallon

The cost-effectiveness can therefore be calculated for the aqueous quart size containers by using,

$$(\$Cost_{Aqueous} - \$Cost_{High-VOC})/Qt / (VOC_{High-VOC} - VOC_{Aqueous}),$$

$$(\$7.25 - \$7.18)/Qt / (6.14 \text{ lb/Gal} - 0.21 \text{ lb/Gal}) = \$0.0472/\text{lb or } \$94.44/\text{ton of VOC}$$

The cost-effectiveness can therefore be calculated for the aqueous one-gallon size containers by using,

$$(\$Cost_{Aqueous} - \$Cost_{High-VOC})/Gal / (VOC_{High-VOC} - VOC_{Aqueous}),$$

$$(\$33.39 - \$18.01)/Gal / (6.14 \text{ lb/Gal} - 0.21 \text{ lb/Gal}) = \$2.5936/\text{lb or } \$5,187.18/\text{ton of VOC}$$

SOY BASED CLEANERS

There are soy based products that meet the 25 g/L and less VOC limits that are currently available. Staff averaged the prices for quart container and one-gallon container sizes and found,

\$9.99/quart and \$32.51/gallon

The cost-effectiveness can therefore be calculated for soy based quart size containers by using,

$$(\$Cost_{Soy} - \$Cost_{High-VOC})/Qt / (VOC_{High-VOC} - VOC_{Soy}),$$

$$(\$9.99 - \$7.18)/Qt / (6.14 \text{ lb/Gal} - 0.21 \text{ lb/Gal}) = \$1.8955/\text{lb or } \$3,790.89/\text{ton of VOC}$$

The cost-effectiveness can therefore be calculated for the soy based one-gallon size containers by using,

$$(\$Cost_{Soy} - \$Cost_{High-VOC})/Gal / (VOC_{High-VOC} - VOC_{Soy}),$$

$$(\$32.51 - \$18.01)/Gal / (6.14 \text{ lb/Gal} - 0.21 \text{ lb/Gal}) = \$2.4452/\text{lb or } \$4,890.39/\text{ton of VOC}$$

PCBTF BASED CLEANERS

There are PCBTF products that meet the 25 g/L and less VOC limits that are currently

available. AQMD staff surveyed several PCBTF products and found several examples with less than 25 g/L of VOC content. Staff averaged the prices for quart container and one-gallon container sizes and found,

\$16.95/quart and \$52.63/gallon

The cost-effectiveness can therefore be calculated for PCBTF quart size containers by using,

$$(\$Cost_{PCBTF} - \$Cost_{High-VOC})/Qt / (VOC_{High-VOC} - VOC_{PCBTF}),$$

$$(\$16.95 - \$7.18)/Qt / (6.14 \text{ lb/Gal} - 0.21 \text{ lb/Gal}) = \$6.5902/\text{lb or } \$13,180.44/\text{ton of VOC}$$

The cost-effectiveness can therefore be calculated for PCBTF one-gallon size containers by using,

$$(\$Cost_{PCBTF} - \$Cost_{High-VOC})/Gal / (VOC_{High-VOC} - VOC_{PCBTF}),$$

$$(\$52.63 - \$18.01)/Gal / (6.14 \text{ lb/Gal} - 0.21 \text{ lb/Gal}) = \$5.8381/\text{lb or } \$11,676.22/\text{ton of VOC}$$

Staff assumes a weighted market penetration for the various technologies and using the cost-effectiveness figures noted above for one-gallon size containers only, the overall cost-effectiveness is as follows:

$$\{(0.50 * \text{Acetone technology}) + (0.30 * \text{Aqueous technology}) + (0.15 * \text{soy based technology}) + (0.05 * \text{PCBTF technology})\},$$

$$\$\{(0.50 * 1,025.30) + (0.30 * 5,187.18) + (0.15 * 4,890.39) + (0.05 * 11,676.22)\}/\text{ton},$$

$$\$ (512.65 + 1,556.16 + 733.56 + 583.81) / \text{ton} = \$3,386.18 / \text{ton of VOC average}$$

Therefore, the overall cost-effectiveness is estimated to be \$3,386/ton of VOC.

IX. INCREMENTAL COST-EFFECTIVENESS

Under Health and Safety Code §40920.6, the AQMD is required to perform an incremental cost analysis when adopting a Best Available Retrofit Control Technology (BARCT) rule or feasible measure required by the California Clean Air Act. To perform this analysis, the AQMD must (1) identify one or more control options achieving the emission reduction objectives for the proposed rule, (2) determine the cost effectiveness for each option, and (3) calculate the incremental cost effectiveness for each option. To determine incremental costs, the AQMD must “calculate the difference in the dollar costs divided by the difference in the emission reduction potentials between each progressively more stringent potential control option as compared to the next less expensive control option.”

Proposed Rule 1143 implements Control Measure CTS-04 from the 2007 Air Quality Management Plan. Because Control Measure CTS-04 is intended to meet feasible measure requirements under the California Clean Air Act, an incremental cost analysis is required and is presented below.

Since alternative control strategies are limited for this area source, staff evaluated two alternative options that would affect all the paint thinner and multi-purpose solvent products

normally found at large box stores such as Home Depot, Lowes and ACE Hardware, as well as the smaller retail sales outlets. Staff analyzed one of the alternative options by reducing the VOC content for all consumer paint thinner and multi-purpose solvent products to 0 (zero) grams per liter. This option relies upon the use of mainly exempt solvents including acetone, PCBTF, and methyl acetate. Another alternative option staff analyzed was to reduce the VOC content for most consumer paint thinner and multi-purpose solvent products to 25 grams per liter of VOC. This would provide a product formulation range of 0 to 25 grams per liter for consumer paint thinners and multi-purpose solvents.

Staff proposes the alternative option which would lower the VOC content to a maximum of 25 grams per liter of VOC. This option will net a reduction of 9.86 tpd of VOC emissions at a cost of \$7,180,375.86 whereas the zero VOC alternate option would net a reduction of 10.2 tpd of VOC emissions at a cost of \$16,333,660.18. Table 6 summarizes the total costs and incremental cost effectiveness of each of three options including a third alternate option of no projects, a reduction to a maximum of 25 grams per liter and a reduction to 0 (zero) grams per liter of VOC.

TABLE 6: COMPARISON OF VOC LIMIT REDUCTIONS AND COSTS

VOC LIMIT (g/L)	VOC REDUCTION (tpy)	ANNUAL COST INCREASE	INCREMENTAL COSTS	INCREMENTAL COST- EFFECTIVENESS (\$/tpy)
> 736	0.0	\$0.00	\$0.00	\$0.00
25	3,595.3	\$7,180,375.86	\$7,180,375.86	\$3,386.18 ⁵
0	3,723.0	\$16,333,660.18	\$9,153,284.32	\$4,287.19 ⁶

X. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Pursuant to the California Environmental Quality Act (CEQA) and the AQMD's Certified Regulatory Program (Rule 110), appropriate documentation will be prepared to analyze any potential adverse environmental impacts associated with the Proposed Rule 1143. Comments received at the public workshop and CEQA scoping meeting will be considered when preparing the CEQA document.

XI. SOCIOECONOMIC ASSESSMENT

A socioeconomic analysis of Proposed Rule 1143 will be performed. A draft report will be released no later than 30 days prior to the AQMD Governing Board hearing.

⁵ Based on the assumption of a weighted market penetration criteria for 25 g/L as explained in the Staff Report.

⁶ Based on the assumption of a weighted market penetration criteria for 0 g/L.

XII. COMPARATIVE ANALYSIS

Health and Safety Code Section 40727.2 requires a written analysis comparing the proposed rule with existing AQMD and Federal regulations. Federal regulations do not regulate VOC emissions from consumer paint thinners and multi-purpose solvents. AQMD Rule 1113 applies to consumers for the use of architectural coatings but does not overlap the requirements of this rule. Rule 442 may apply to some consumer uses however the daily use limits per facility are above those used by a consumer. Other AQMD coating and solvent rules apply to the industrial uses. No other AQMD rules apply to solvent and thinner use for consumers.

XIII. DRAFT FINDINGS

Health and Safety Code Section 40727 requires that prior to adopting, amending or repealing a rule or regulation, the AQMD Governing Board shall make findings of necessity, authority, clarity, consistency, non-duplication, and reference based on relevant information presented at the hearing. The draft findings are as follows:

Necessity – State and federal health-based ambient air quality standards for ozone are exceeded in the AQMD. The reduction of VOC from Proposed Rule 1143 is part of a comprehensive strategy to meet federal and State air quality standards.

Authority - The AQMD Governing Board obtains its authority to adopt, amend, or repeal rules and regulations from Health and Safety Code Sections 39002, 40000, 40001, 40440, 40441, 40702, 41508, and 41700.

Clarity - The AQMD Governing Board has determined that Proposed Rule 1143 – Consumer Paint Thinners and Multi-purpose Solvents, is written and displayed so that the meaning can be easily understood by persons directly affected by them.

Consistency - The AQMD Governing Board has determined that Proposed Rule 1143 – Consumer Paint Thinners and Multi-purpose Solvents, is in harmony with, and not in conflict with or contradictory to, existing statutes, court decisions, federal or state regulations.

Non-Duplication - The AQMD Governing Board has determined that Proposed Rule 1143 – Consumer Paint Thinners and Multi-purpose Solvents, does not impose the same requirement as any existing state or federal regulation, and the proposed amendments are necessary and proper to execute the powers and duties granted to, and imposed upon, the AQMD.

Reference - In adopting this regulation, the AQMD Governing Board references the following statutes which the AQMD hereby implements, interprets or makes specific: California Health and Safety Code sections 40001, 40440, and 40702.

XIV. DRAFT CONCLUSIONS AND RECOMMENDATIONS

Staff recommends that PR 1143 be adopted to further reduce VOC emissions from consumer products and implement control measure CM#2007CTS-04 of the 2007 Air Quality Management Plan.

XV. PUBLIC COMMENTS AND RESPONSES

INDUSTRY CONCERNS

Jurisdictional Regulation Authority

The NPCA has raised issues with jurisdictional regulation authority. NPCA contends that the District does not have the authority to regulate consumer solvents as they are considered consumer products. The District has two rules currently in place that regulate products that are of a consumer product category. Rule 1174 is the rule that limits VOCs in charcoal lighter fluid and Rule 1171 limits the volume of high-VOC aerosol solvents as brake cleaners. In addition, as discussed in Section II, Legislative Authority, the District is required by the 2007 AQMP to implement control measures for categories that are not regulated.

Flammability of Acetone

The NPCA contend that acetone has an extremely high flammability risk and is inappropriate for consumers, as compared to a low odor mineral spirits. Their concerns maintain that acetone could significantly increase fire hazards associated with transportation, storage, use, and disposal of clean-up solvent. The NFPA has rated acetone as 3 on their rating system, meaning that acetone is a high flammability solvent. Table 1 showed that all of the other multi-purpose solvents and lacquer thinners have a rating of 3 for flammability as well, with the exception of mineral spirits that is rated by the NFPA as a 2. Acetone does have a lower flash point than most of the other solvents, but common multi-purpose solvents and lacquer thinners, which use acetone in their solvent blend, have similar flash points. Methyl Ethyl Ketone also has a low flash point albeit not as low as acetone, but much less than the other multi-purpose solvents. Acetone, Isopropyl Alcohol, Lacquer Thinner, MEK, Toluene, and VM&P Naphtha all have flash points less than room temperature (68°), so the high flammability risk for acetone is similar to the currently available high-VOC solvents. The storage of acetone or the use would not be expected to result in significant adverse hazardous impacts. Acetone vapors will not cause an explosion unless the vapor concentration exceeds 26,000 ppm. In comparison, toluene vapors can cause an explosion at 12,000 ppm whereas mineral spirits and toluene vapor concentrations can cause an explosion at 10,000 ppm.

Inclusion of Reactivity Based Approach

A portion of the stakeholders favor a reactivity-based approach to approving solvents for use under the proposed rule. The USEPA exempted acetone as a VOC, but does not recognize a reactivity-based ozone control strategy for architectural coatings and clean-up solvents. Staff will continue to study the impacts of a reactivity based approach, with consideration for toxics and PM_{2.5} formation.

XVI. REFERENCES

Final 2007 Air Quality Management Plan – Appendix IV-A (CM#2007CTS-04), June 2007

http://www.aqmd.gov/aqmp/07aqmp/aqmp/appendix_IV-A.pdf

Initial Staff Proposals for Categories (Mass-Based)

California Air Resources Board
2008 Consumer Products Regulation Amendments
August 29, 2007

<http://www.arb.ca.gov/consprod/regact/cpwg2008/initialmassbase.pdf>

Clean Air Solvent (CAS) Certification Program and Suppliers of low-VOC Cleaning Materials and Equipment

<http://www.aqmd.gov/rules/cas/prolist.html>

Health and Safety Code §41712, Regulations to Control Volatile Organic Compounds in Consumer Products

2008 California Air Pollution Control Laws, 2008 Matthew Bender & Company, Inc., P.O. Box 7587, Charlottesville, VA 22906-7587, 800-446-3410, ISBN: 978-1-4224-4648-5
www.lexisnexis.com,

Low-VOC, Low Toxicity Alternatives for Consumer Product Cleanup and Thinning Solvents

IRTA March 2007

<http://www.irta.us/Consumer%20Products%20DTSC.pdf>

NFPA – National Fire Protection Association – MSDS

Entry last updated: Thursday, February 28, 2008

<http://ilpi.com/msds/ref/nfpa.html>

Final Staff Report for: Proposed Amended Rule 1171 – Solvent Cleaning Operations

October 1, 2003

Acetone, Denatured Alcohol, Isopropyl Alcohol, Lacquer Thinners, Methyl Ethyl Ketone, Mineral Spirits, Paint Thinners, Toluene, Turpentine, VM&P Naphtha, and Xylene,

<http://www.cdc.gov/niosh/pdfs/75-168a.pdf> (xylene)

Solvents;

Acetone, Denatured Alcohol, Isopropyl Alcohol, Lacquer Thinners, Methyl Ethyl Ketone, Mineral Spirits, Paint Thinners, Toluene, Turpentine, VM&P Naphtha, and Xylene,

<http://en.wikipedia.org/wiki/solvents>

APPENDIX A

BACKGROUND - SOLVENTS

Acetone

The discussion for acetone is covered in Section III of this Proposed Draft Staff Report.

Denatured Alcohol

Denatured alcohol is a colorless liquid and has a strong odor of ethanol. The term *denatured* means that it's toxic to human health and has no usefulness as a beverage. Denatured alcohol is an ethanol that can be used as a solvent for cleaning and in some cases, thinning. It can also be used as a sanding aid for sanding wood. Denatured alcohol can be found for sale at most large box stores and hardware stores.

As a VOC – Denatured alcohol is a high-VOC containing solvent. Staff researched multiple denatured alcohol MSDS documents that revealed a 24 g/L spread for the material VOC (791 g/L to 815 g/L).

Flammability – Denatured alcohol has a NFPA rating of 3 for flammability indicating that it is a highly flammable solvent.

Toxicology – Denatured alcohol has a NFPA rating of 1 for health rating which indicates that it has a slight health risk. The main health risk is ingestion which can cause blindness or death.

Isopropyl Alcohol

Isopropyl Alcohol is a colorless liquid and has a strong odor of rubbing alcohol. It's also referred to as isopropanol, isopro, rubbing alcohol and frequently abbreviated as "IPA". Isopropyl Alcohol is widely used as a solvent and dries rapidly. It is used commonly as a solvent to clean electronic circuits and electronic devices. Isopropyl Alcohol can be found for sale at most large box stores and hardware stores.

As a VOC – Isopropyl Alcohol is a high-VOC containing solvent. Staff researched multiple Isopropyl Alcohol MSDS documents that revealed a 28 g/l spread in the material VOC (787 g/L to 815 g/L).

Flammability – Isopropyl Alcohol has a NFPA rating of 3 for flammability indicating that it is a highly flammable solvent.

Toxicology – Isopropyl Alcohol has a NFPA rating of 1 for health rating which indicates it has a slight health risk. It is approximately twice as toxic as ethanol and can be fatal if swallowed and not treated. Isopropyl Alcohol is oxidized by the liver which then produces acetone from it. It can also irritate the eyes, nose, and throat for brief periods. Isopropyl oil, used in the manufacturing of isopropyl alcohol, has been linked to paranasal sinus cancer.

Lacquer Thinners

Lacquer Thinners are manufactured from petroleum distillates and blended with other solvents. It offers similar solvency as toluene but is normally less expensive. Lacquer thinners are used as thinners for epoxies, automotive paint and gravure inks for printing. The main use for

lacquer thinners is a thinning agent for nitrocellulose and acrylic lacquers.

As a VOC – Lacquer Thinner is a high-VOC containing solvent. Staff researched multiple lacquer thinner MSDS documents that revealed a 111 g/L spread in the material VOC (739 g/L to 850 g/L).

Flammability – Lacquer Thinner has a NFPA rating of 3 for flammability indicating that it is a highly flammable thinner.

Toxicology – Lacquer Thinner has a NFPA rating of 2 for health which indicates that it has a moderate health risk. The vapors from Lacquer Thinner can irritate the eyes, skin and upper respiratory tract. The vapors can also cause headache, nausea, dizziness, and loss of coordination. The liquid can cause redness of the skin and eyes.

MEK (Methyl Ethyl Ketone)

MEK is the acronym for Methyl Ethyl Ketone but it is also known as butanone. It is a manufactured organic solvent and has a butterscotch odor similar to acetone. It is used as a solvent because of its ability to dissolve gums, resins, cellulose acetate and nitrocellulose coatings.

As a VOC – MEK is a high-VOC containing solvent. Staff researched multiple MEK MSDS documents that revealed a 7 g/L spread in the material VOC (803 g/L to 810 g/L).

Flammability – MEK has a NFPA rating of 3 for flammability indicating that it is a highly flammable solvent.

Toxicology – MEK has a NFPA rating of 1 for health which indicates that it has a slight health risk. The vapors from MEK can irritate the nose, throat, skin, and eyes.

Mineral Spirits

Mineral Spirits is a petroleum distillate and is sometimes known as Stoddard solvent. Mineral spirits is used as a solvent to remove oils, grease, and carbon and as a cleaning agent added to thread cutting oils. Mineral spirits can be further refined to remove the aromatics resulting in a product called Odorless mineral spirits. The Odorless mineral spirits are favored for oil painting because they are less toxic and do not emit strong odors like mineral spirits.

As a VOC – Mineral spirits is a high-VOC solvent but not as high as some of the other solvents. Staff researched multiple mineral spirits MSDS documents that revealed a 31 g/L spread in the material VOC (759 g/L to 790 g/L).

Flammability – Mineral spirits has a NFPA rating of 2 for flammability indicating that it is a moderately flammable solvent.

Toxicology – Mineral spirits has a NFPA rating of 1 for health rating indicating that it has a slight health risk. The vapors from mineral spirits can irritate the eyes, nose, throat, skin, and in larger doses can cause chemical pneumonitis.

Paint Thinners

Paint Thinners are similar to low odor mineral spirits and are manufactured from petroleum distillates. The primary purpose is to thin oil based paints however, paint thinners can be used effectively for degreasing tools and general household cleaning.

As a VOC – Paint thinner is a high-VOC containing solvent. Staff researched multiple paint thinner MSDS documents that revealed a 107 g/L spread in the material VOC (775 g/L to 882 g/L).

Flammability – Paint thinner has a NFPA rating of 3 for flammability indicating that it is a highly flammable thinner.

Toxicology – Paint thinner has a NFPA rating of 2 for health which indicates that it has a moderate health risk. The vapors from paint thinner can irritate the eyes, nose, and throat and can cause headaches and dizziness.

Toluene

Toluene is a colorless liquid and has a sweet, pungent, benzene like odor. It is used as a common solvent for its ability to dissolve paint, rubber, printing inks, adhesives, lacquers and sealants.

As a VOC – Toluene is a high-VOC containing solvent. Staff researched multiple toluene MSDS documents that revealed a material VOC of 863 g/L.

Flammability – Toluene has a NFPA rating of 3 for flammability indicating that it is a highly flammable solvent.

Toxicology – Toluene has a NFPA rating of 2 for health which indicates that it has a moderate health risk. The vapors from Toluene can be intoxicating but in large doses it can cause extreme fatigue, mental confusion, nausea, headache and dizziness. Since toluene has low water solubility it cannot exit the body through normal routes such as sweat, urine, or feces.

Turpentine

Turpentine is bio-based solvent that is used as a thinning solvent for oil-based paints and is manufactured by obtaining the tap sap of pines trees and then distilling it into a fluid.

As a VOC – Turpentine is a high-VOC containing solvent. Staff researched multiple turpentine MSDS documents that revealed a material VOC of 863 g/L.

Flammability – Turpentine has a NFPA rating of 3 for flammability indicating that it is a highly flammable solvent.

Toxicology – Turpentine has a NFPA rating of 1 for health which indicates that it has a slight health risk. The vapors from turpentine can burn the skin, eyes, and cause damage to both the respiratory and central nervous systems.

VM&P Naphtha

Naphtha is a petroleum-based chemical and is also known as petroleum ether. It is

manufactured by distilling petroleum or coal tar and is commonly used as a cleaning solvent. The VM & P means “Varnish Makers and Printers”.

As a VOC – Naphtha is a high-VOC containing solvent. Staff researched multiple naphtha MSDS documents that revealed 125 g/L spread in the material VOC (750 g/L to 875 g/L).

Flammability – Naphtha has a NFPA rating of 3 for flammability indicating that it is a highly flammable solvent.

Toxicology – Naphtha has a NFPA rating of 2 for health indicating that it has a moderate health risk. Short term exposures to high levels of naphtha can cause headaches, dizziness, confusion, lack of muscle coordination, and sense of balance. Other symptoms can also include irritation of the skin, nose, eyes, throat, and stomach discomfort but at higher levels naphtha can cause unconsciousness which could result in death.

Xylene

Xylene is a colorless, sweet-smelling liquid that is produced from petroleum. The term xylene, also known as xylol, refers to a mixture of three benzene derivatives (isomers) that can be differentiated by their forms, *meta*-xylene (m-xylene), *ortho*-xylene (o-xylene), and *para*-xylene (p-xylene), as a solvent.

As a VOC – Xylene is a high-VOC containing solvent. Staff researched multiple MSDS documents that revealed a 12 g/L spread in the material VOC (860 g/L to 872 g/L).

Flammability – Xylene has a NFPA rating of 3 for flammability indicating that it is a highly flammable solvent.

Toxicology – Xylene has a NFPA rating of 2 for health indicating that it has a moderate health risk. Short term exposures to high levels of xylene can cause headaches, dizziness, confusion, and lack of muscle coordination and sense of balance. Other symptoms can also include irritation of the skin, nose, eyes, throat, and stomach discomfort but at higher levels xylene can cause unconsciousness which could then lead to death.

APPENDIX B

TDS & MSDS REFERENCES

TDS & MSDS SHEET REFERENCES

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Mills Paint Sales, MSDS for VM&P Naphtha

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Mills Paint Sales, MSDS for Solvent #2 Xylene

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Nazdar Shawnee, MSDS for DCA01 Thinner,

<http://nazdar.com/wv/private/document.aspx?prd=DCA01~~PDF~~MTR~~NAM~~EN~~09/14/2001~~THINNER>

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